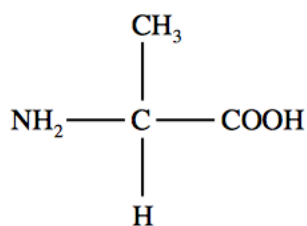
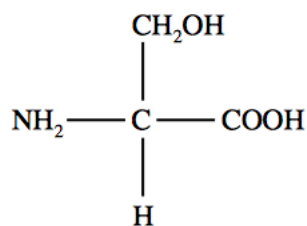


1.

The diagram shows two amino acids.



- (a) (i) Identify the **R** group of one of the amino acids by drawing a ring around it. [1]
- (ii) Using suitable molecular diagrams, show how the two amino acids would be joined together to form a dipeptide. [2]

- (b) Explain the term *tertiary* structure of a protein molecule. [2]

.....

.....

.....

.....

- (c) A protein in solution can be detected in the laboratory.

- (i) Name the reagent that you would use. [1]

.....

- (ii) What would be the colour of a positive reaction? [1]

.....

- (d) Why is collagen referred to as a fibrous protein? [2]

.....

.....

.....

.....

2.

The following table lists some features of biological compounds. Complete the table by ticking (✓) in the appropriate column(s) if the feature is found in carbohydrates, lipids or proteins. You can tick one, two or three columns for each feature.

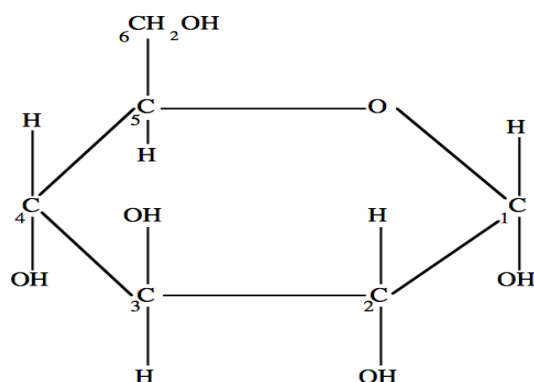
<i>Feature</i>	<i>Carbohydrate</i>	<i>Lipid</i>	<i>Protein</i>
can be saturated or unsaturated			
contain peptide bonds			
contain the elements carbon, hydrogen and oxygen			
can contain disulphide bonds			
cellulose and glycogen are examples			

[5]

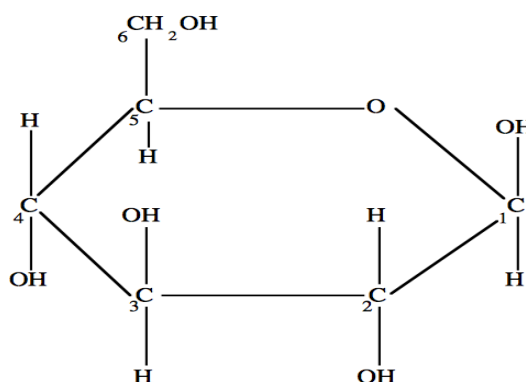
(Total 5 marks)

3.

The diagram below shows two possible structures for glucose.



α glucose



β glucose

Both molecules α and β have the same general formula $C_6H_{12}O_6$.

- (a) (i) What is the term used to describe compounds with the same formula but different structure? [1]

.....

- (ii) Using the information in the above diagram distinguish between α and β glucose molecules. [1]

.....

.....

- (b) Indicate, by placing a ring around the appropriate atoms on the diagram above, which atoms are lost when the two glucose molecules join together. [1]

- (c) Name the bond that is formed when the molecules join together. [1]

.....

- (d) Name the sugar that is formed after the molecules have joined. [1]

.....

(e) Starch and cellulose are both made up from a number of glucose molecules. Suggest **two** differences between the structures of starch and cellulose. [2]

(i)

.....

(ii)

.....

(f) Give **one** function of **each** of the molecules in cells.

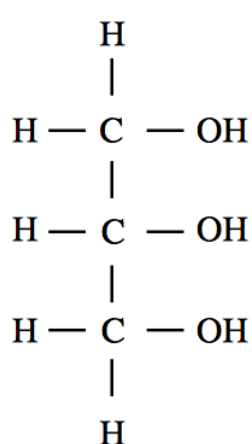
(i) Starch [1]

(ii) Cellulose [1]

(Total 9 marks)

4.

The diagram shows the components of one type of lipid molecule.



Component A



Component B

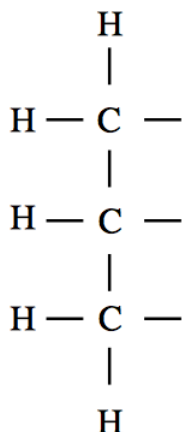
(a) Name the components: [2]

A **B**

- (b) Draw a ring around the atoms that would be removed if a bond were formed between the components. [1]
- (c) What type of chemical reaction would be involved in the formation of such a bond? [1]

.....

- (d) Complete the following diagram to show the structural formula of a compound in which three molecules of component **B** become bound to one molecule of component **A**. [2]



- (e) (i) Name the type of lipid formed in this way. [1]

.....

- (ii) State one function which these compounds perform in animal **cells**. [1]

.....

- (f) Cooking food in olive oil is believed to be healthier than using animal fat.

- (i) What type of disease is believed to be affected? [1]

.....

- (ii) How does component **B** of olive oil differ from component **B** in animal fat? [1]

.....

- (iii) Give **one other** difference between fats and oils. [1]

.....

(Total 11 marks)

5.

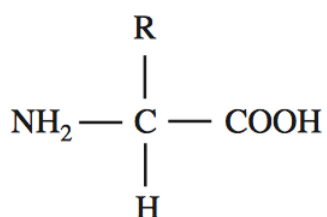
1. Complete the table below by placing ticks in the appropriate column(s). Each row may have one or more ticks.

	<i>Monosaccharide</i>	<i>Disaccharide</i>	<i>Structural Polysaccharide</i>	<i>Storage Polysaccharide</i>
Glucose is an example of				
Cellulose is an example of				
Amylose is an example of				
Maltose is an example of				
Insoluble				
Deoxyribose is an example of				
Glycogen is an example of				

(Total 7 marks)

6.

The diagram shows the structure of a biologically important molecule.



- (a) State the name given to this general type of molecule. [1]

.....

- (b) Which part of the molecule gives it **acidic** properties? [1]

.....

- (c) Which part of the molecule gives it **basic** properties? [1]

.....

(d) How does one amino acid differ from another?

[1]

(e) (i) Two of the molecules shown in the diagram can join together. Draw a diagram below to show the products formed when two such molecules link. [2]

(ii) What type of chemical reaction is involved?

[1]

(iii) State the name of the bond formed between the two molecules.

[1]

(Total 8 marks)

7.

Below is a list of chemicals which may be found in cells.

A	Pentose	F	Amino acid
B	Glycerol	G	Glucose
C	Sucrose	H	Glycogen
D	Calcium	I	Cellulose
E	Water		

Each of the following statements applies to one or more of these chemicals.

After each statement, write in the box the letter or letters which correspond(s) to the chemical(s) being described. Each letter may be used once, more than once, or not at all.

(a) The carbohydrate in plant cell walls.

(b) The carbohydrate in nucleic acids.

(c) Contains acidic and basic groups.

(d) The most abundant inorganic component of cells.

(e) A common polymer in liver cells.

(f) Can form part of a helix.

(Total 7 marks)

8.

Fully complete the following table using a tick (✓) if the atoms/structures **could be** present in the molecules indicated and a cross (X) if the atoms/structures are **not** present in the molecules. [6]

	<i>Protein</i>	<i>DNA</i>	<i>Disaccharide</i>	<i>Phospholipid</i>
Carbon and Hydrogen and Oxygen				
Nitrogen and Sulphur				
Disulphide bonds				
Glycosidic bonds				
Peptide bonds				
Ester bonds.				

(Total 6 marks)

9.

The following diagrams represent the structure of some common **carbohydrates**.

(a) Using a letter from the diagram identify the following carbohydrates.

[5]

Triose

☐

Amylose

☐

Maltose

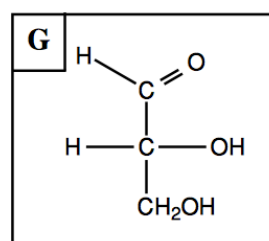
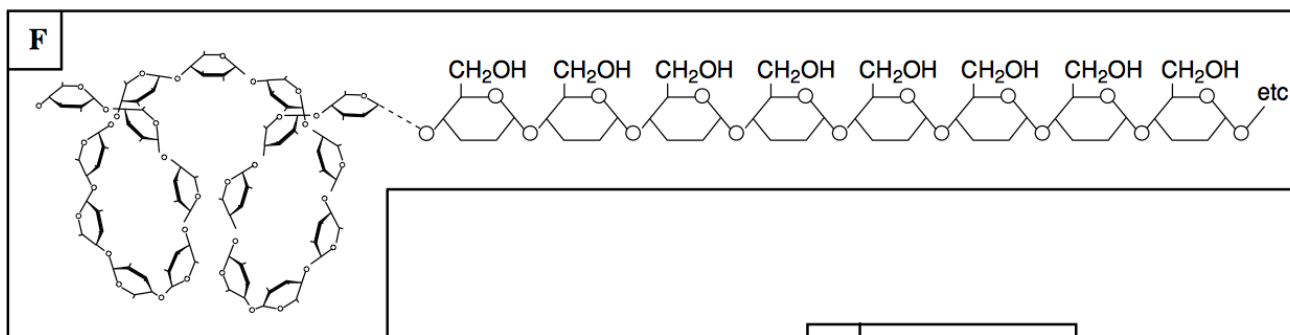
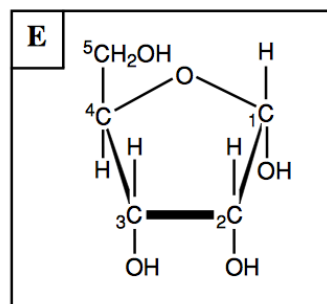
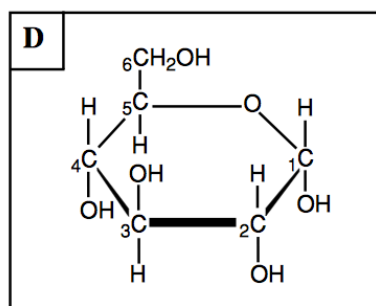
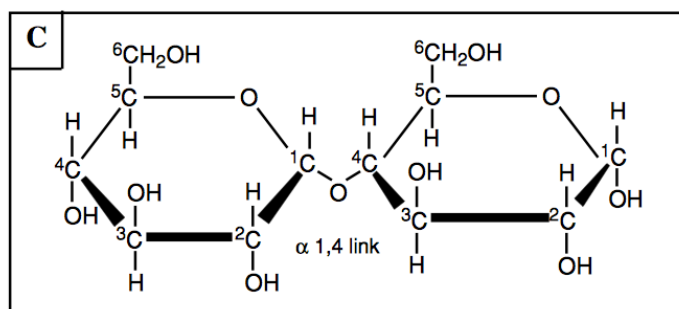
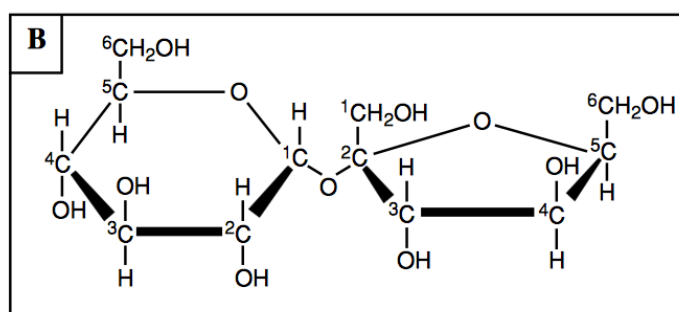
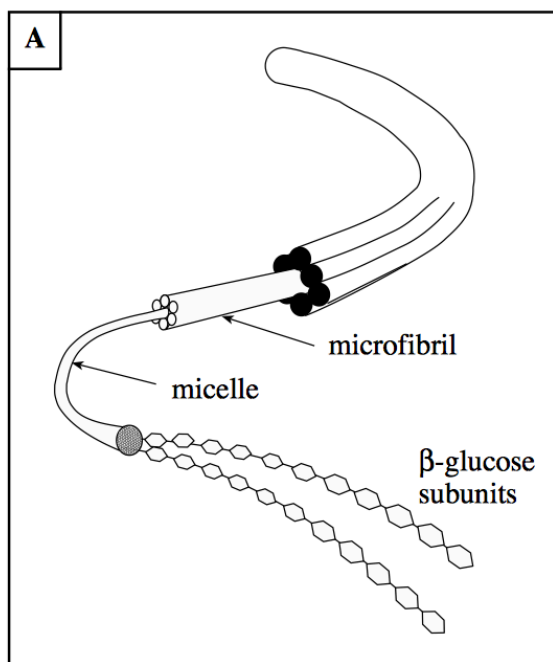
☐

Cellulose

☐

Alpha glucose

☐



- (b) Polysaccharides are often used by cells to store energy, suggest **two** reasons why polysaccharides are ideal for this function. [2]

1

.....

2

.....

- (c) Briefly explain how you could distinguish, using a practical technique, between the presence of a reducing sugar such as maltose and a non-reducing sugar, such as sucrose. [3]

.....

.....

.....

.....

.....

.....

(Total 10 marks)

10.

- (a) Using an example from the list below complete the following table. You can use the same example more than once or not at all.

magnesium, sodium hydrogen carbonate (NaHCO_3), red blood cell,
starch, amino acid, muscle, leaf.

	<i>Example</i>
organic molecule	
tissue	
inorganic compound	
element	
polymer	

[5]

- (b) Give **two** structural differences between the following pairs of molecules:

- (i) starch and cellulose; [2]

.....

.....

- (ii) triglyceride and phospholipid. [2]

.....

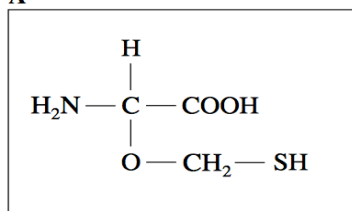
.....

(Total 9 marks)

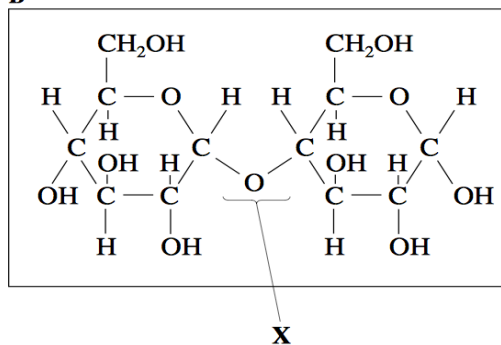
11.

3. The following diagrams represent organic molecules.

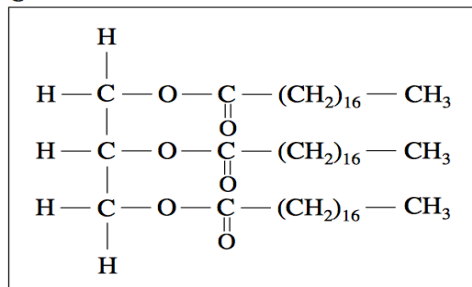
A



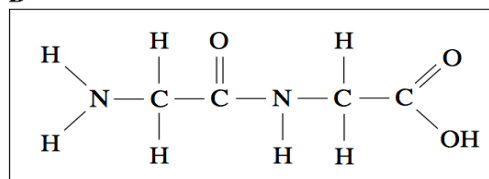
B



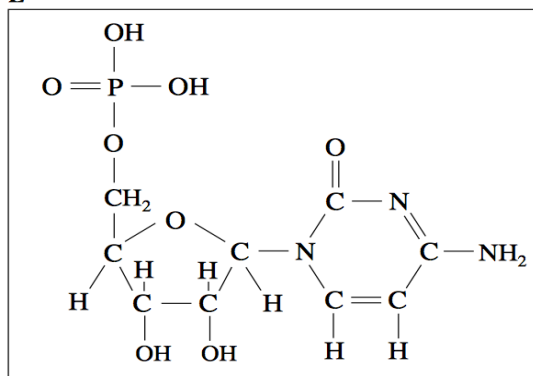
C



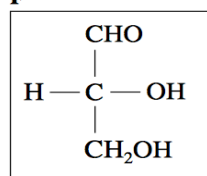
D



E



F



(a) Using only the letters next to the diagrams, indicate in the relevant space below which structure:

- | | | |
|---|-------|-----|
| (i) contains a peptide bond? | | [1] |
| (ii) contains a glycosidic bond? | | [1] |
| (iii) is an amino acid? | | [1] |
| (iv) is a monosaccharide? | | [1] |
| (v) would require three molecules of water for complete hydrolysis? | | [1] |
| (vi) is a nucleotide? | | [1] |

(b) (i) What type of reaction has formed bond X in molecule B? [1]

.....

(ii) What molecule is removed during this reaction? [1]

.....

(Total 8 marks)

12.

(a) Water is a polar molecule and small clusters of water molecules are held together by hydrogen bonds.

(i) Why is water described as a polar molecule? [2]

.....

.....

.....

.....

(ii) By means of a labelled diagram, show how water molecules are held together by hydrogen bonds. [1]

(b) Suggest why the following properties of water are important to living organisms.

(i) It is a universal solvent. [1]

.....

.....

(ii) The latent heat of vaporisation is high. [1]

.....

.....

(iii) Water has a high specific heat. [1]

.....

.....

(iv) Ice is less dense than water. [1]

.....

.....

(v) Water is transparent. [1]

.....

.....

(Total 8 marks)

11)

13.

2. (i) Fill in the table below to indicate the structural differences between triglycerides (lipids) and phospholipids. [3]

	<i>Triglyceride</i>	<i>Phospholipid</i>
<i>Structural difference 1</i>		
<i>Structural difference 2</i>		
<i>Where compound occurs in organisms</i>		

- (ii) Stearic acid and oleic acid are both examples of fatty acids. Each contain 17 carbons in the hydrocarbon chain.

Stearic acid is a saturated fatty acid.

Oleic acid is an unsaturated fatty acid.

How would the structure of these two fatty acids differ? [1]

.....

.....

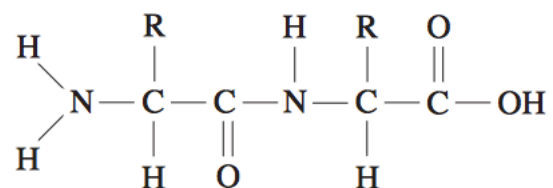
- (iii) A high intake of which of these fatty acids might be a contributory factor in heart disease? [1]

.....

(Total 5 marks)

14.

The diagram shows a molecule which can be split by an enzyme to produce two amino acids.



- (a) Name the molecule. [1]

.....

- (b) (i) Draw an arrow on the diagram to indicate the bond which is broken by the enzyme. [1]

- (ii) Name the type of reaction which causes the bond to break. [1]

.....

- (c) The two amino acids formed are not identical. How would their structures differ? [1]

.....

- (d) Approximately how many different amino acids are found in proteins?

Draw a circle around your choice. [1]

10 20 30 40 50

- (e) (i) Name the most common type of secondary structure found in proteins. [1]

.....

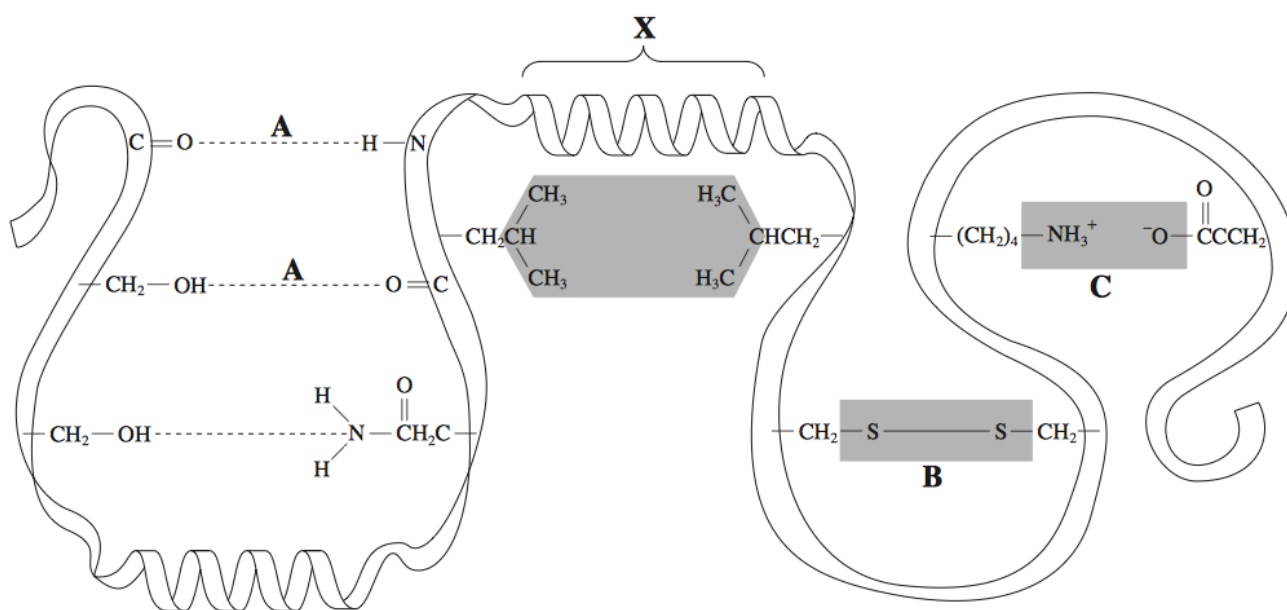
- (ii) How is this structure maintained? [1]

.....

(Total 7 marks)

15.

3. The diagram shows the structure of a protein. The Letters **A** to **C** indicate three types of bond found in a protein.



- (a) (i) State the name of the type of bond found in the primary structure of a protein. [1]

.....

- (ii) State the names of the types of bond **A** to **C**. [3]

A

B

C

- (b) The area marked **X** on the diagram forms part of the secondary structure of a protein.

- (i) State the name given to this form of secondary structure. [1]

.....

- (ii) How is this form of secondary structure held together? [1]

.....

.....

.....

- (iii) State the name of a further form of secondary structure. [1]

.....

(c) State the highest level of protein structure shown in the diagram. [1]

(d) A cellulose molecule is made up of a large number of monosaccharide units.

(i) Name the monosaccharide and its form. [2]

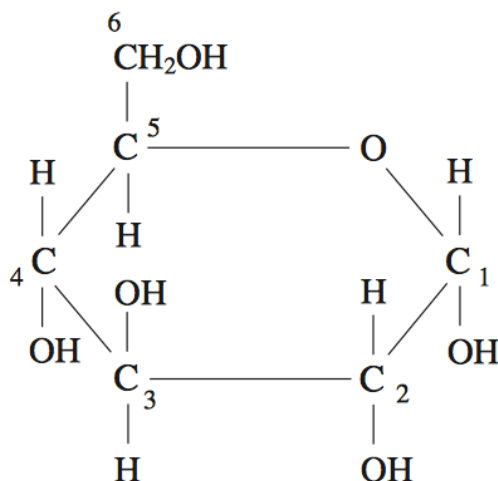
(ii) Describe how two monosaccharides are joined together. [2]

(iii) Explain how the structure of cellulose makes it suitable for use in plant cell walls. [2]

(Total 14 marks)

16.

The diagram below shows a molecule of α -glucose.



- (a) (i) What name is given to this type of monosaccharide? [1]

.....

- (ii) Name the disaccharide formed when two molecules of α -glucose combine. [1]

.....

- (iii) What else is formed in this reaction? [1]

.....

- (iv) Which carbon atoms (give numbers from the diagram) form the glycosidic bond? [1]

.....

- (b) (i) Explain how the diagram for β -glucose would differ from the above diagram. [1]

.....

- (ii) Why are α - and β -glucose referred to as isomers? [1]

.....

.....

- (c) Which of the two isomers form the polysaccharide cellulose in plants? [1]

.....

- (d) Apart from a few insects and some snails, the great majority of animals have failed to evolve an enzyme that will digest cellulose. Explain why cellulose is so much less reactive than other polysaccharides. [1]

.....

.....

- (e) Explain **one** advantage that the cellulose structure confers on the plant. [1]

.....

(Total 9 marks)

17.

Complete the following sentences, about polysaccharides, by inserting the most appropriate word(s) to fill in the blanks. [7]

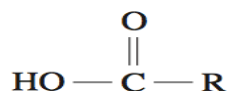
Starch, which is found in plants, consists of two components. The first is a branch-chained component known as amylopectin and the second is an unbranched component called The unbranched component consists of a type of glucose known as glucose whose molecules are joined together by bonds. These bonds are formed by a condensation reaction which involves the elimination of a molecule of to form a long chain. Cellulose, another plant polysaccharide, consists of glucose molecules. Adjacent chains of cellulose are held together by bonds. These chains are bundled together to form which gives cellulose its high tensile strength.

(Total 7 marks)

18.

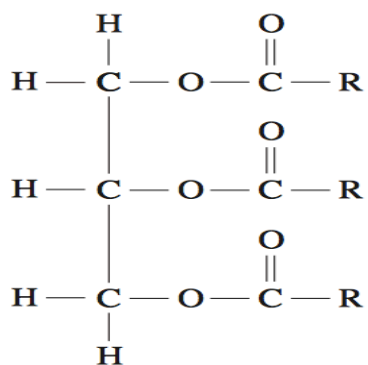
The diagram (A) below shows the general formula of a fatty acid.

Diagram A



Lipids are formed when three fatty acids react with another molecule (diagram B).

Diagram B



- (a) (i) Name the molecule. [1]
.....
- (ii) In what way is the reaction which forms a lipid, similar to the formation of a dipeptide or a disaccharide? [1]
.....
- (iii) Describe **one** feature of the R group in fatty acids. [1]
.....

(b) The lipids found in plants are often described as oils, because they are liquids at room temperatures. Animal fats are solids at room temperature.

(i) Describe the structural difference between a solid animal fat and a liquid plant oil. [1]

.....

.....

(ii) Plant oils are often found in seeds. What function do they perform there? [1]

.....

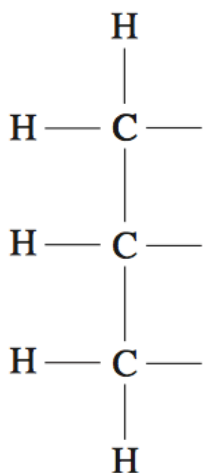
(iii) What makes lipids particularly suitable for this function? [1]

.....

.....

(c) (i) Complete the diagram below to show the structure of a phospholipid (Diagram C). [1]

Diagram C



(ii) How do the properties of diagram C differ from those of diagram B? [2]

.....

.....

(iii) Explain how this change plays a vital role in cells. [2]

.....

.....

19.

- (a) (i) By means of a simple labelled diagram indicate the structure of a triglyceride (fat) molecule. (Detailed biochemical structure is not expected). [2]

- (ii) Name the bonding involved in the formation of a triglyceride. [1]

.....

- (iii) Give **two** differences between the structure you have drawn and a phospholipid. [2]

.....
.....
.....
.....

- (b) Suggest **one** reason why animals tend to store energy in the form of fat rather than carbohydrate. [1]

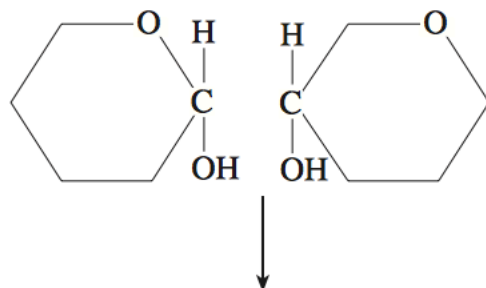
.....
.....

- (c) What is the difference between a saturated and an unsaturated fat? [1]

.....
.....
.....

20.

- (a) (i) Complete the diagram to show the reaction between two molecules of glucose and the products formed. [3]



- (ii) Name the organic molecule formed. [1]

.....

- (iii) Name the inorganic molecule released during the reaction. [1]

.....

- (iv) Name the type of reaction. [1]

.....

- (b) One species of bacterium *Streptococcus mutans* produces the enzyme glucosyl transferase that catalyses the polymerisation of glucose molecules. Polymers of glucose form part of the plaque on teeth which leads to dental disease.

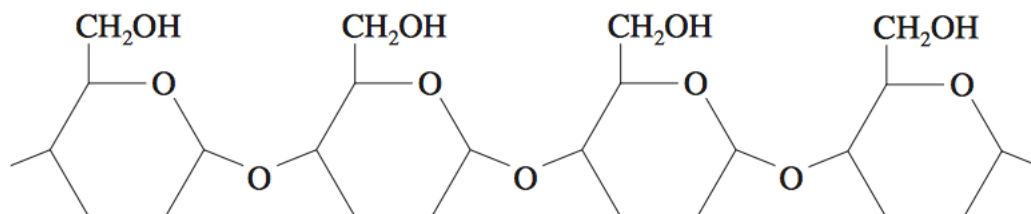
- (i) What is polymerisation? [1]

.....

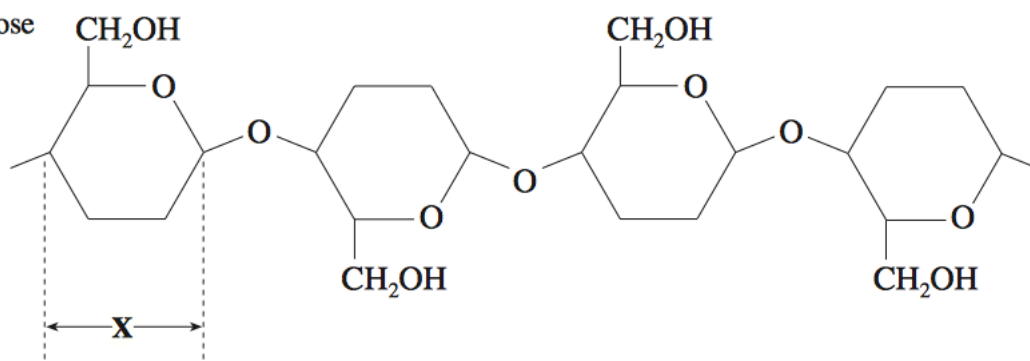
21.

3. The diagrams show part of a molecule of starch (A) and part of a molecule of cellulose (B). The hexagonal shapes represent hexose sugars.

A. starch



B. cellulose



- (a) Name monosaccharide **X** and its form. [1]

.....

- (b) Name the bond formed between two hexose sugars. [1]

.....

- (c) State **two** structural differences between starch and cellulose. [2]

.....

.....

- (d) Starch is a compact storage polysaccharide. Cellulose has a structural role in plant cell walls. Describe how cellulose units are arranged in a complete molecule and how this arrangement gives cellulose a high tensile strength. [2]

.....

.....

.....

(Total 6 marks)

22.

- (a) The level of protein structure is decided by the folding of the molecule and the types of bonds present.

Tick (✓) the boxes in the table to show all the bonds present at each level of protein structure. [3]

Level of protein structure	Types of bonds			
	peptide	hydrogen	disulphide	ionic
Primary				
Secondary				
Tertiary				

- (b) (i) How does the quaternary structure of a protein differ from the tertiary structure? [1]

.....

- (ii) Give an example of a quaternary protein. [1]

.....

(Total 5 marks)

23.

Below is a list of chemicals which may be found in cells.

- | | | | |
|---|------------|---|-----------|
| A | magnesium | F | calcium |
| B | maltose | G | phosphate |
| C | amino acid | H | water |
| D | cellulose | I | sucrose |
| E | iron | | |

Each of the following statements applies to one or more of these chemicals.

After each statement, write in the box the letter or letters which correspond(s) to the chemical(s) being described. Each letter may be used once, more than once, or not at all.

- | | |
|--|--------------------------|
| (a) Found in bones and teeth. | <input type="checkbox"/> |
| (b) A non-reducing sugar | <input type="checkbox"/> |
| (c) Found in chlorophyll in leaves. | <input type="checkbox"/> |
| (d) A polysaccharide found in plant cell walls. | <input type="checkbox"/> |
| (e) Found attached to lipids in the plasma membrane. | <input type="checkbox"/> |
| (f) A large quantity of energy is needed to raise its temperature. | <input type="checkbox"/> |

(Total 6 marks)

24.

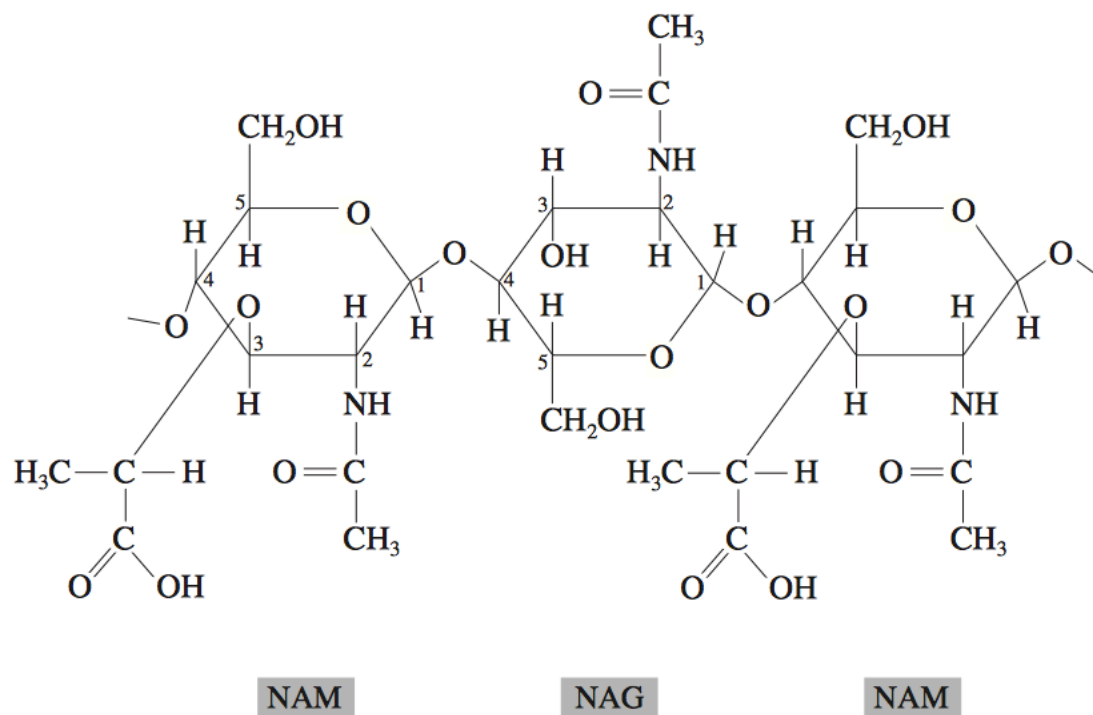
Heteropolysaccharides consist of long chains of monosaccharides. Each monosaccharide is attached to a non-carbohydrate part.

Bacterial cell walls are made from a heteropolysaccharide consisting of two different monosaccharides – abbreviated to NAG and NAM.

The linear polymer is made up of alternating NAG and NAM molecules, linked by glycosidic bonds.

These chains are arranged in the same way as cellulose of plant cell walls.

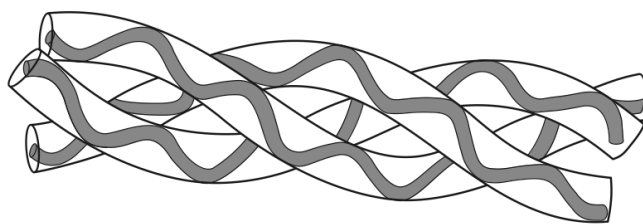
The glycosidic bonds can be broken by the enzyme lysozyme.



- (a) (i) Draw a circle around the part of **one** of the monosaccharide units that is 'non-carbohydrate'. [1]
- (ii) On the diagram, draw an arrow labelled **B** to show a bond which could be broken by the enzyme lysozyme. [1]
- (iii) Name the type of reaction involved in the breaking of the bond. [1]
-
- (iv) Explain what is meant by the phrase 'arranged in the same way as the chains in cellulose'. [3]
-
-
-
-

25.

(a) The diagram represents a section of a collagen molecule.

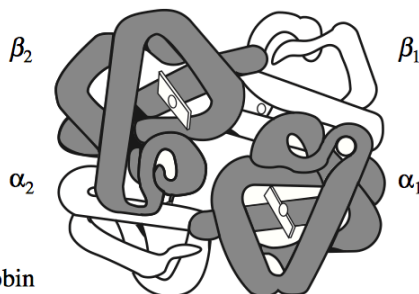


(i) Name the group of proteins to which collagen belongs. [1]

(ii) Describe the structure of a collagen molecule. [3]

(iii) State **one** function of collagen. [1]

(b) Haemoglobin belongs to another group of proteins called globular proteins. The diagram shows a molecule of haemoglobin.



Structure of haemoglobin

(i) Describe **three** differences between collagen and haemoglobin that you can see in the diagrams. [3]

1.
2.
3.

(ii) Name **one other** type of globular protein. [1]

(Total 9 marks)

26.

6. (a) Name the cell organelle which is the site of energy release in a mammal. [1]

.....

(b) The table shows figures from the respiration of carbohydrate and lipid in a mammal.

<i>Energy source</i>	<i>Energy released / kJg⁻¹ food</i>	<i>Metabolic water produced / g g⁻¹ food</i>	<i>Oxygen consumed / dm³ g⁻¹ food</i>
Carbohydrate	17.2	0.56	0.83
Lipid	38.9	1.07	2.02

- (i) With reference to the figures in the table, state **one advantage** and **one disadvantage** of storing lipid rather than carbohydrate. [2]

advantage

.....

disadvantage

.....

- (ii) Suggest **two other** reasons why mammals store lipids. [2]

1.

2.

(c) The potato contains stored starch and protein.

- (i) State **two** uses for the protein in the growing potato plant. [2]

1.

2.

- (ii) The starch and protein must be hydrolysed before being used by the potato plant. Explain what is meant by the term *hydrolysed*. [2]

.....

.....

.....

- (iii) Name the products resulting from the **complete** hydrolysis of: [2]

Starch

Protein

(Total 11 marks)

27.

Inorganic ions are needed by living organisms. Complete the table below to give a function for **each** of the four ions. [4]

<i>Ion</i>	<i>Function</i>
Magnesium	
Iron	
Phosphate	
Calcium	

(Total 4 marks)

28.

Complete the following passage by inserting the correct terms in the spaces provided. [6]

Cellulose is a fibrous molecule. It is a carbohydrate and is the main component of the of plants. Cellulose consists of chains of glucose molecules which are joined together by 1-4 bonds. Each adjacent glucose molecule is rotated by ° resulting in a chain. Chains are held together by bonds forming groups of chains known as

(Total 6 marks)

29.

5. (a) When a triglyceride molecule is broken down name:

(i) the products formed; [2]

.....

(ii) the type of bond broken and describe the process. [3]

.....

.....

.....

.....

(b) Describe **two** functions of lipids in plants. [2]

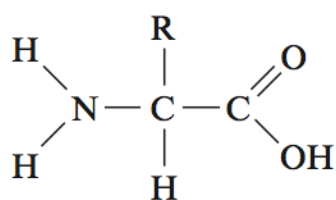
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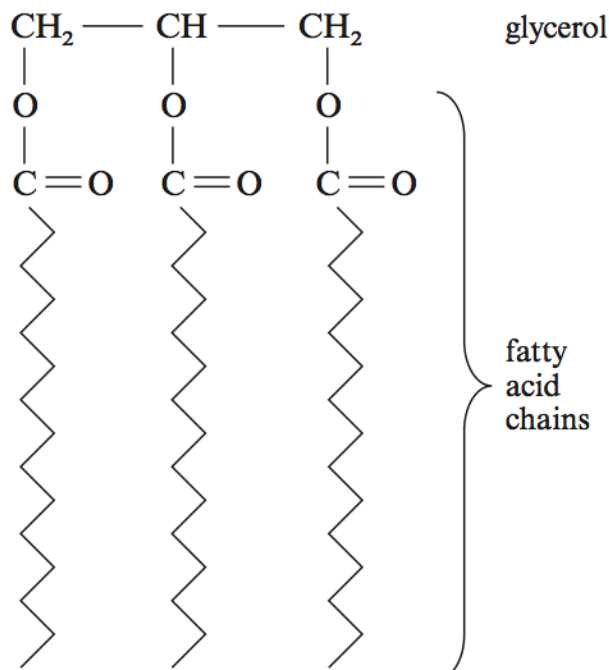
(Total 7 marks)

30.

The diagrams below show two molecules, **A** and **B**, which are found in living organisms.



molecule **A**



glycerol

fatty acid chains

molecule **B**

- (a) (i) Name molecules **A** and **B**. [2]

A

B

- (ii) Name an element found in molecule **A** that is not found in molecule **B**. [1]

.....

- (b) Many molecules of **A** can join together to form a long chain. Name the process that joins the molecules together and the bond formed when they join. [2]

.....

.....

- (c) (i) Describe a suitable test that could be performed to show that a solution contained polymers of molecule **A**. [2]

.....

.....

.....

- (ii) Suggest a problem that could arise in using this test if very low concentrations of the polymer are present in the solution. [1]

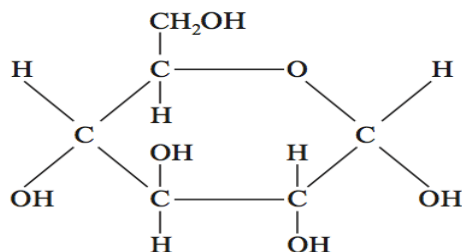
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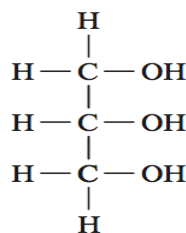
(Total 8 Marks)

31.

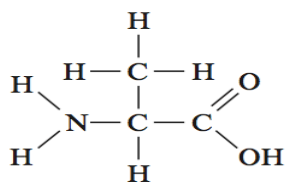
The following diagrams represent the structure of four biologically important compounds.



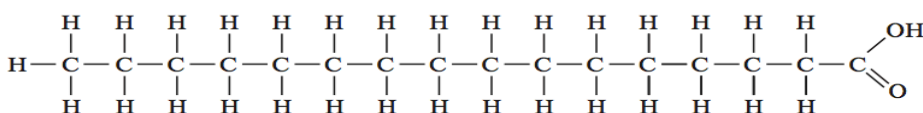
A



B



C



D

- (a) A chemical element found in a molecule of compound **C** is not found in molecules of the other three compounds. **Name** this element. [1]

.....

- (b) A reducing sugar in solution can be detected in the laboratory.

- (i) Describe the biochemical test you would use to show that the solution contained a reducing sugar. [2]

.....

- (ii) Which of the compounds **A** to **D** will give a positive result with this biochemical test? [1]

.....

- (c) Which of the compounds **A** to **D** has molecules that will join together by peptide bonds? [1]

.....

- (d) (i) Which of the compounds **A** to **D** is a fatty acid? [1]

.....

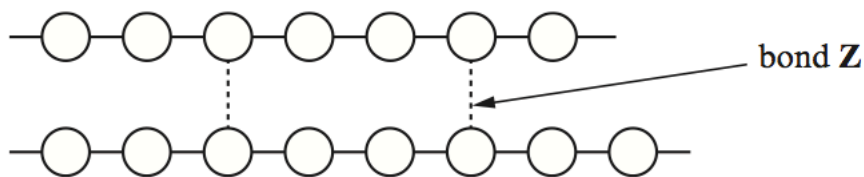
- (ii) State how the structure of a saturated fatty acid differs from the structure of an unsaturated fatty acid. [2]

.....

(Total 8 marks)

32.

3. The diagram represents part of a cellulose molecule.



(a) (i) Name bond **Z** as shown on the diagram. [1]

.....

(ii) Explain the importance of bond **Z** in the role of cellulose in plant cell walls. [2]

.....
.....
.....

(b) (i) Name the chemical reaction by which monomers join together to form cellulose. [1]

.....

(ii) Chitin has many chemical and structural similarities to cellulose.
In chitin what additional compound replaces one of the –OH groups in each of its monosaccharides? [1]

.....

(iii) State the structural role of chitin in insects and describe its properties that make it suitable for this role. [1]

.....
.....



(c) Other polysaccharides have a storage function.
Name a storage polysaccharide found in:

(i) animal cells; [1]

.....

(ii) plant cells. [1]

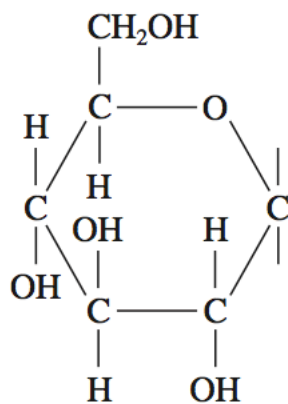
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(Total 8 marks)

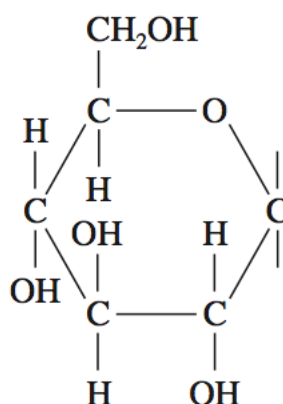
33.

Carbohydrate molecules contain the chemical elements carbon, hydrogen and oxygen only.

- (a) The diagrams below show structural formulae of two isomers of glucose. Complete the drawings to distinguish between the α and β isomers. [1]



α glucose



β glucose

- (b) (i) Starch and cellulose are both polymers of glucose, but they are formed from different isomers. State the isomer which is found in: [1]

Cellulose

Starch

- (ii) Explain how the structures of starch and cellulose are related to their functions as storage and structural molecules respectively. [4]

.....

.....

.....

.....

.....

.....

.....

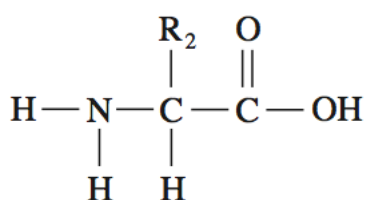
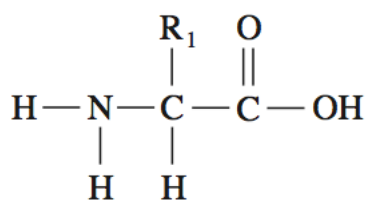
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.....

(Total 6 marks)

34.

The diagram below shows two molecules which are sub-units of proteins.



(a) (i) Complete the diagram above to show how a reaction takes place to join the two molecules. [3]

(ii) Name the type of reaction involved. [1]

.....

(iii) Name the type of bond formed. [1]

.....

(b) (i) Why is the model of the structure of biological membranes described as 'fluid mosaic'? [2]

.....
.....
.....

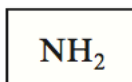
35.

Red blood cells are involved with the transport of oxygen around the body. Red blood cells lack internal organelles and their cytoplasm contains haemoglobin. Haemoglobin is a protein that consists of four polypeptide chains linked together.

- (a) State the level of protein structure shown by haemoglobin. [1]

.....

- (b) The diagram below shows one of the polypeptide chains from haemoglobin.



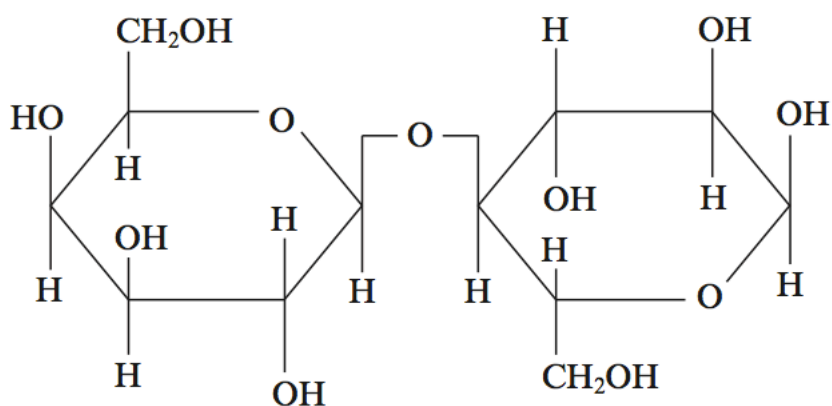
- (i) On the diagram above, use an arrow to **clearly label** an alpha –helix. [1]
- (ii) Complete the diagram above by writing in the empty box, the molecular group that would be present at the end of the polypeptide chain. [1]
- (iii) Name **two** types of bonds that would be present to maintain the 3D shape of this polypeptide chain. [1]

.....

.....

36.

Lactose is a disaccharide found in milk. The diagram below shows the structure of lactose.



(a) Lactose can be broken down into its constituent monosaccharides.

(i) Complete the diagram above to show how lactose is broken down. [2]

(ii) State the type of reaction involved in the breakdown of lactose. [1]

.....

(iii) Name the bond that is broken during this reaction. [1]

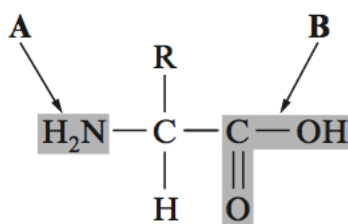
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(iv) Name the molecules produced when lactose is broken down. [1]

.....

37.

(a) The diagram below shows the structure of an amino acid.



(i) Name the two shaded groups **A** and **B** shown on the diagram above. [2]

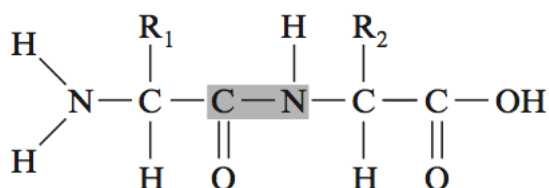
A

B

(ii) What is represented by letter **R** in the diagram above? [1]

.....

(b) The diagram below shows two amino acids joined together.



Using the diagram shown above:

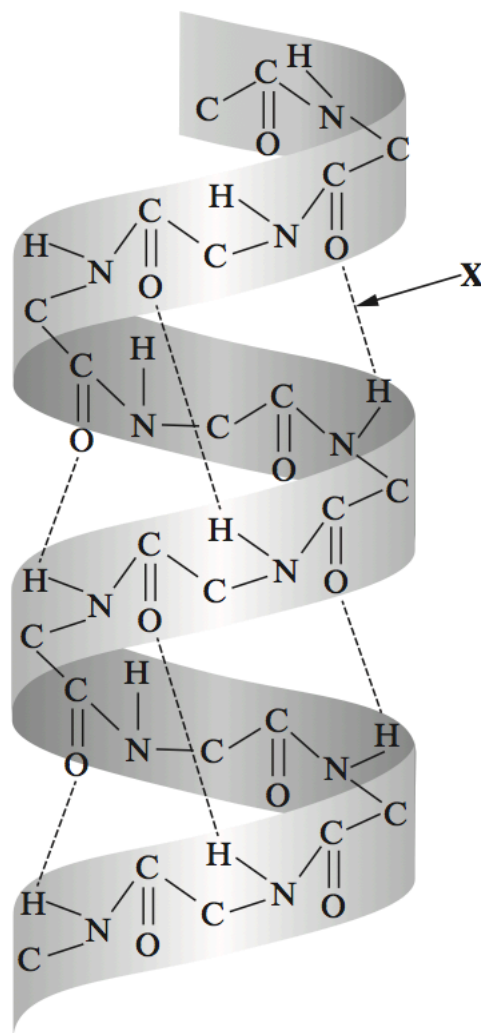
(i) Name the type of molecule shown. [1]

.....

(ii) Name the bond highlighted in diagram (b) above. [1]

.....

(c) The diagram below shows part of a protein molecule.



(i) Name bond X shown on the diagram above. [1]

.....

(ii) What name is given to the shape of this molecule? [1]

.....

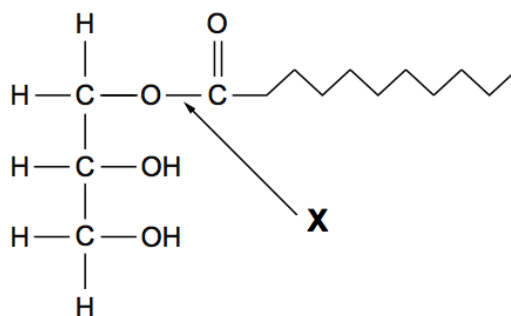
(iii) What level of protein structure does the diagram above show? [1]

.....

(Total 8 marks)

38.

(a) The diagram below shows a monoglyceride.



During the digestion of monoglycerides, the bond labelled **X** is broken down by the enzyme lipase.

(i) Name the bond labelled **X** in the diagram above. [1]

.....

(ii) State the **type** of reaction involved in the breakdown of the monoglyceride. [1]

.....

(iii) In the space below **draw** and **name** the products of the breakdown of the monoglyceride. [2]

(iv) Explain why triglycerides are not considered to be polymers. [1]

.....

(b) (i) Two fatty acids which are common in triglycerides are stearic acid and oleic acid. Stearic acid has the chemical formula of $C_{17}H_{35}COOH$ and oleic acid has the chemical formula of $C_{17}H_{33}COOH$. What type of fatty acid is oleic acid? Give a reason for your answer. [2]

.....

(ii) Apart from energy storage, state **two** functions of triglycerides in a mammal. [2]

.....

Essay

1.
 - (a) Give an account of the molecular structure of carbohydrates. [10]
2.
 - (a) Distinguish between primary, secondary, tertiary and quaternary structure of proteins. [10]
3.
 - (b) Describe the structure and outline the role of **proteins** in living organisms. [10]
4.
 - (a) Describe the **four** levels of protein structure. [10]
5.
 - (b) Without water, life on this planet would not exist as we know it. With reference to the structure and properties of water, discuss its importance to living organisms. [10]
6.
 - (b) Explain how the properties of water are important to plants and animals. Use examples where appropriate. [10]
7.
 - (b) Describe the structure and functions of lipids in plants and animals. [10]
8.
 - (b) Describe the similarities and differences in the structure of amino acids and nucleotides. [10]
9.
 - (b) Describe the structure and role of proteins in living organisms. [10]
10.
 - (a) Give an account of the structure and function of carbohydrates. [10]
11.
 - (a) Using examples to illustrate your answer, describe how the structures of polysaccharides are related to their functions. [10]